

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: NAFTALI SAUERBRUN	Art Unit: Not yet assigned
Serial No.: Not yet assigned	Examiner: Not yet assigned
Filed: June 11, 2001	
For: METHOD OF MANUFACTURING A METALLIC FILTER (as amended)	

Assistant Commissioner For Patents  
Washington, D.C. 20231

**PRELIMINARY AMENDMENT FOR CONTINUATION APPLICATION**  
**FILED PURSUANT TO 37 C.F.R. 1.53(b)(1)**

Dear Sir:

Prior to examination of this divisional application, please enter the amendment in the divisional application and consider the following remarks. In the above-captioned parent application (U.S. Patent Application Ser. No. 09/074,927 filed May 6, 1998), a Petition for Extension of Time and appropriate fee are submitted to extend the due date for response to the Examiner's Final Office Action dated January 10, 2001 to Monday, June 11, 2001 (the first business day following Sunday, June 10, 2001). Accordingly, the parent application and the present divisional application are copending.

\\

\\

\\

IN THE TITLE:

Please replace lines 1-2 on page 1 with the following:

TITLE

METHOD OF MANUFACTURING A METALLIC FILTER

IN THE FIGURES:

Please replace informal FIGS. 1-5 with formal FIGS. 1-5 as provided in the 3 sheets of drawings attached in Appendix B.

IN THE SPECIFICATION:

1. On page 1, line 4, please insert the following paragraph prior to the section entitled "FIELD OF THE INVENTION":

RELATED APPLICATIONS

The present application is a continuation application of U.S. Patent Application Ser. No. 09/074,927 filed May 6, 1998.

2. On page 8, please replace the paragraph beginning on line 9 and ending on line 20 with:

Once the non-woven mat 116 has been formed with the desired number of layers, using the desired fiber sizes to yield the required filtering efficiency, the non-woven mat 116 is heat treated in a hydrogen furnace (with an pressure slightly greater than atmospheric pressure) at 1925 to 2100° Fahrenheit for 25 minutes to 1 hour (see Step S102 in Fig. 5). Next, the non-woven mat 116 is calendered to produce the required thickness for the filter element 102 (see S104). Afterwards, the non-woven mat 116 is cut and shaped to the dimensions for producing the size filter element 102 to be formed (see S106). After this, the non-woven mat 116 is placed

in a sandwiched composite mat 122 with the other three screen layers 114, 118 and 120 (see S108). In preferred embodiments, the coarse and fine screens 114, 118 and 120, and the non-woven mat 116 are formed from stainless steel. However in alternative embodiments different metals such as titanium, nickel, Carpenter 20 Cb-3, Hastelloy R or X, or the like may be used with the choice being dependent on the filtering environment and the materials to be filtered.

IN THE ABSTRACT:

Please replace the paragraph beginning on line 2 and ending on line 13 of page 16 with:

A metallic filter for filtering a fluid includes a filter element. A structure of the filter element is strengthened by a heat treatment after assembly to resist  $P$  pressure changes in the fluid to minimize irreversible compression and degradation of the filter element due to the partial collapse of the filter element from a rise in the  $P$  pressures of the fluid passing through the filter element. Preferably, the filter element includes a non-woven, metallic mat. Also, the filter element include at least two metallic support screens, and the non-woven metallic mat is sandwiched between the at least two metallic support screens. In addition, the filter element is preferably formed from a material selected from stainless steel, titanium, nickel, Carpenter 20 Cb-3, Hastelloy R and Hastelloy X. Further, the filter element is pleated and formed to surround a support member, and the heat treatment after assembly occurs after pleating and forming. In addition, the non-woven metallic mat includes metallic fibers, and is also heat treated before assembly to provide a first bonding of the metallic fibers.

IN THE CLAIMS:

Please cancel claims 1 and 4-32 without prejudice or disclaimer and add claims 33-48 as follows.

33. A method of manufacturing a metallic filter for filtering a fluid, the method comprising:
- heat treating a non-woven metallic mat having a plurality of metallic fibers so as to form a plurality of sinter bonds among said plurality of metallic fibers;
  - creating a filter element having said non-woven, metallic mat;
  - pleating said filter element, said pleating causing at least one of said plurality of sinter bonds to be damaged;
  - fixedly forming said filter element into a filter assembly having a desired shape; and
  - repairing said at least one damaged sinter bond by heat treating said filter element after said filter element has been fixedly formed into said filter assembly.
34. The method according to claim 33, wherein said desired shape has an end and further wherein fixedly forming said filter element into said filter assembly having said desired shape includes coupling a weld ring to said end of said desired shape.
35. The method according to claim 33, wherein fixedly forming said filter element into said filter assembly having a desired shape includes welding said filter element along a seam.
36. The method according to claim 33, wherein creating said filter element includes sandwiching said non-woven metallic mat between at least two support screens.
37. The method according to claim 36, wherein said at least one of said support screens is also metallic and wherein heat treating said filter element after said filter element has

been fixedly formed into said filter assembly further forms a plurality of sinter bonds between said non-woven metallic mat and said at least one metallic support screen.

38. The method according to claim 33, wherein the non-woven metallic mat is formed from a material selected from the group consisting essentially of stainless steel titanium, nickel, Carpenter 20 Cb-3, Hastelloy R and Hastelloy X.
39. The method according to claim 33, further including forming said non-woven metallic mat by placing a first layer of metallic fibers on top of a second layer of metallic fibers.
40. The method according to claim 39, wherein said metallic fibers in said first layer are of a different size than said metallic fibers of said second layer.
41. A method of manufacturing a metallic filter for filtering a fluid, the method comprising:
  - heat treating a non-woven metallic mat having a plurality of metallic fibers so as to form a plurality of sinter bonds among said plurality of metallic fibers;
  - creating a filter element having said non-woven, metallic mat and a first metallic support screen;
  - pleating said filter element;
  - fixedly forming said filter element into a filter assembly having a desired shape; and
  - heat treating said filter element after said filter element has been fixedly formed into said filter assembly so as to bond said filter element to said metallic support screen.
42. The method according to claim 41, wherein said desired shape has an end and further wherein fixedly forming said filter element into said filter assembly having said desired shape includes coupling a weld ring to said end of said desired shape.

43. The method according to claim 41, wherein fixedly forming said filter element into said filter assembly having a desired shape includes welding said filter element along a seam.
44. The method according to claim 41, wherein said filter element includes a second metallic support screen and further wherein creating said filter element includes sandwiching said non-woven metallic mat between said first support screen and said second support screen.
45. The method according to claim 41, wherein the non-woven metallic mat is formed from a material selected from the group consisting essentially of stainless steel titanium, nickel, Carpenter 20 Cb-3, Hastelloy R and Hastelloy X.
46. The method according to claim 45, wherein said metallic support screen is formed from a material selected from the group consisting essentially of stainless steel titanium, nickel, Carpenter 20 Cb-3, Hastelloy R and Hastelloy X.
47. The method according to claim 41, further including forming said non-woven metallic mat by placing a first layer of metallic fibers on top of a second layer of metallic fibers.
48. The method according to claim 47, wherein said metallic fibers in said first layer are of a different size than said metallic fibers of said second layer.

REMARKS

Claims 1 and 4-32 were previously pending in the parent application. Claims 17-32 had previously been withdrawn from consideration pursuant to the Examiner's restriction requirement dated June 24, 1999. In the Office Action dated June 24, 1999, the Examiner stated that the original application was drawn to two distinct inventions – a metallic filter (original claims 1-16), which the Examiner classified in class 210, subclass 493.1, and a method of manufacturing a metallic filter (original claims 17-32), which the Examiner classified in class 29, subclass 896.62. In response to the Examiner's restriction requirement, Applicant elected to pursue claims drawn to the metallic filter.

Although none of the claims in the present application are identical to those in the non-elected claims of the original application, the claims in the present application are all drawn to a method of manufacturing a metallic filter. Accordingly, Applicant characterizes the present application as a divisional application and anticipates that the continuation application will be classified in class 29, subclass 896.62.

Claims 1 and 4-32 are cancelled by this Amendment. New claims 33-48 have been added by way of this Amendment. Reexamination and reconsideration of the application are respectfully requested for the following reasons.

The present invention relates to a metallic filter having a pleated filter element that includes a non-woven metallic mat and a metallic separating screen sandwiched between two metallic support screens. Weld rings are coupled to opposite ends of the filter element. Because the pleating and welding processes tend to damage sintering between the layers of the metallic mat, metallic separating screen and metallic support screens, the filter element is heat-treated

after the filter element is pleated, mounted on a support tube and coupled to the weld rings. This heat treatment repairs breaks in the sintering between layers of the filter element.

Independent claim 33 recites:

A method of manufacturing a metallic filter for filtering a fluid, the method comprising:

heat treating a non-woven metallic mat having a plurality of metallic fibers so as to form a plurality of sinter bonds among said plurality of metallic fibers;

creating a filter element having said non-woven, metallic mat;

pleating said filter element, said pleating causing at least one of said plurality of sinter bonds to be damaged;

fixedly forming said filter element into a filter assembly having a desired shape; and

*repairing said at least one damaged sinter bond by heat treating said filter element after said filter element has been fixedly formed into said filter assembly.*

Applicant submits that neither the Applicant's Admitted Prior Art (AAPA) or U.S. Patent No. 4,169,059 (the "Storms reference"), cited by the Examiner in previous Office Actions, discloses a method of forming a filter involving "repairing said at least one damaged sinter bond."

Moreover, claim 41 recites:

A method of manufacturing a metallic filter for filtering a fluid, the method comprising:

heat treating a non-woven metallic mat having a plurality of metallic fibers so as to form a plurality of sinter bonds among said plurality of metallic fibers;

creating a filter element having said non-woven, metallic mat and a first metallic support screen;

pleating said filter element;

fixedly forming said filter element into a filter assembly having a desired shape; and



*heat treating said filter element after said filter element has been  
fixedly formed into said filter assembly so as to bond said filter element to said  
metallic support screen.*

Applicant respectfully submits that neither the AAPA nor the Storms reference discloses a method of making a metallic filter involving “heat treating said filter element after said filter element has been fixedly formed into said filter assembly so as to bond said filter element to said metallic support screen.”

For these reasons, Applicant submits that independent claim 33 and claims 34-40 directly or indirectly depending therefrom distinguish over the AAPA and the Storms reference.

Applicant further submits that independent claim 41 and claims 42-48 directly or indirectly depending therefrom distinguish over these references. Accordingly, Applicant respectfully requests that claims 33-48 be allowed.

//

//

//

//

//

//

//

//

//

//

//

//

CONCLUSION

Applicant believes that the foregoing amendments place the application in condition for allowance, and a favorable action is respectfully requested. If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles telephone number (213) 488-7100 to discuss the steps necessary for placing the application in condition for allowance should the Examiner believe that such a telephone conference would advance prosecution of the application.

Respectfully submitted,

PILLSBURY WINTHROP LLP

Dated: June 11, 2001

By: Charanjit Brahma  
Charanjit Brahma  
Registration No. 46,574  
Attorney for Applicant(s)

725 South Figueroa Street, Suite 2800  
Los Angeles, CA 90017-5406  
Telephone: (213) 488-7100  
Facsimile: (213) 629-1033

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington D.C. 20231, on

June 11, 2001  
(date)

By: Charanjit Brahma  
Charanjit Brahma, Reg. No. 46,574

**APPENDIX A**

**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE TITLE**

Please amend the title of the application by replacing lines 1-2 on page 1 as follows:

**TITLE:**

[METALLIC FLUID FILTER AND METHOD OF MAKING THE SAME] METHOD OF  
MANUFACTURING A METALLIC FLUID.

**IN THE SPECIFICATION**

On page 1, line 4, please insert the following paragraph prior to the section entitled  
“FIELD OF THE INVENTION”:

**RELATED APPLICATIONS**

The present application is a continuation application of U.S. Patent Application Ser. No.  
09/074,927 filed May 6, 1998.

On page 8, please delete “115” and replace with the following:

Once the non-woven mat [115] 116 has been formed with the desired number of layers,  
using the desired fiber sizes to yield the required filtering efficiency, the non-woven mat 116 is  
heat treated in a hydrogen furnace (with an pressure slightly greater than atmospheric pressure)  
at 1925 to 2100° Fahrenheit for 25 minutes to 1 hour (see Step S102 in Fig. 5). Next, the non-  
woven mat 116 is calendered to produce the required thickness for the filter element 102 (see  
S104). Afterwards, the non-woven mat 116 is cut and shaped to the dimensions for producing  
the size filter element 102 to be formed (see S106). After this, the non-woven mat 116 is placed

in a sandwiched composite mat 122 with the other three screen layers 114, 118 and 120 (see S108). In preferred embodiments, the coarse and fine screens 114, 118 and 120, and the non-woven mat 116 are formed from stainless steel. However in alternative embodiments different metals such as titanium, nickel, Carpenter 20 Cb-3, Hastelloy R or X, or the like may be used with the choice being dependent on the filtering environment and the materials to be filtered.

IN THE ABSTRACT:

On page 16, line 9, please delete “stainless steel titanium” and replace with the following:

A metallic filter for filtering a fluid includes a filter element. A structure of the filter element is strengthened by a heat treatment after assembly to resist P pressure changes in the fluid to minimize irreversible compression and degradation of the filter element due to the partial collapse of the filter element from a rise in the P pressures of the fluid passing through the filter element. Preferably, the filter element includes a non-woven, metallic mat. Also, the filter element include at least two metallic support screens, and the non-woven metallic mat is sandwiched between the at least two metallic support screens. In addition, the filter element is preferably formed from a material selected from [stainless steel titanium] stainless steel, titanium, nickel, Carpenter 20 Cb-3, Hastelloy R and Hastelloy X. Further, the filter element is pleated and formed to surround a support member, and the heat treatment after assembly occurs after pleating and forming. In addition, the non-woven metallic mat includes metallic fibers, and is also heat treated before assembly to provide a first bonding of the metallic fibers.

**IN THE DRAWINGS**

Please replace informal FIGS. 1-5 with formal FIGS. 1-5 as provided in the 3 sheets of drawings attached in Appendix B.

**IN THE CLAIMS:**

Claims 1 and 4-32 are canceled without prejudice or disclaimer. New claims 33-48 are added by way of this Amendment.

--33. (Added) A method of manufacturing a metallic filter for filtering a fluid, the method comprising:

heat treating a non-woven metallic mat having a plurality of metallic fibers so as to form a plurality of sinter bonds among said plurality of metallic fibers;

creating a filter element having said non-woven, metallic mat;

pleating said filter element, said pleating causing at least one of said plurality of sinter bonds to be damaged;

fixedly forming said filter element into a filter assembly having a desired shape; and

repairing said at least one damaged sinter bond by heat treating said filter element after said filter element has been fixedly formed into said filter assembly.--

--34. (Added) The method according to claim 33, wherein said desired shape has an end and further wherein fixedly forming said filter element into said filter assembly having said desired shape includes coupling a weld ring to said end of said desired shape.--

--35. (Added) The method according to claim 33, wherein fixedly forming said filter element into said filter assembly having a desired shape includes welding said filter element along a seam.--

--36. (Added) The method according to claim 33, wherein creating said filter element includes sandwiching said non-woven metallic mat between at least two support screens.--

--37. (Added) The method according to claim 36, wherein said at least one of said support screens is also metallic and wherein heat treating said filter element after said filter element has been fixedly formed into said filter assembly further forms a plurality of sinter bonds between said non-woven metallic mat and said at least one metallic support screen.--

--38. (Added) The method according to claim 33, wherein the non-woven metallic mat is formed from a material selected from the group consisting essentially of stainless steel titanium, nickel, Carpenter 20 Cb-3, Hastelloy R and Hastelloy X.--

--39. (Added) The method according to claim 33, further including forming said non-woven metallic mat by placing a first layer of metallic fibers on top of a second layer of metallic fibers.--

--40. (Added) The method according to claim 39, wherein said metallic fibers in said first layer are of a different size than said metallic fibers of said second layer.--

--41. (Added) A method of manufacturing a metallic filter for filtering a fluid, the method comprising:

heat treating a non-woven metallic mat having a plurality of metallic fibers so as to form a plurality of sinter bonds among said plurality of metallic fibers;

creating a filter element having said non-woven, metallic mat and a first metallic support screen;

pleating said filter element;

fixedly forming said filter element into a filter assembly having a desired shape; and

heat treating said filter element after said filter element has been fixedly formed into said filter assembly so as to bond said filter element to said metallic support screen.--

--42. (Added) The method according to claim 41, wherein said desired shape has an end and further wherein fixedly forming said filter element into said filter assembly having said desired shape includes coupling a weld ring to said end of said desired shape.--

--43. (Added) The method according to claim 41, wherein fixedly forming said filter element into said filter assembly having a desired shape includes welding said filter element along a seam.--

--44. (Added) The method according to claim 41, wherein said filter element includes a second metallic support screen and further wherein creating said filter element includes sandwiching said non-woven metallic mat between said first support screen and said second support screen.--

--45. (Added) The method according to claim 41, wherein the non-woven metallic mat is formed from a material selected from the group consisting essentially of stainless steel titanium, nickel, Carpenter 20 Cb-3, Hastelloy R and Hastelloy X.--

--46. (Added) The method according to claim 45, wherein said metallic support screen is formed from a material selected from the group consisting essentially of stainless steel titanium, nickel, Carpenter 20 Cb-3, Hastelloy R and Hastelloy X.--

--47. (Added) The method according to claim 41, further including forming said non-woven metallic mat by placing a first layer of metallic fibers on top of a second layer of metallic fibers.--

--48. (Added) The method according to claim 47, wherein said metallic fibers in said first layer are of a different size than said metallic fibers of said second layer.--

11/11/2011 11:11:11 AM